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Fig. 2 shows a schematic view of a laser scanning microscope with a laser 14, a pinhole diaphragm 15 arranged in the laser beam path, a measurement diaphragm 16 conjugated to the pinhole diaphragm 15, a detector 17, and a beam splitter 18.

The pinhole diaphragm 15 which is irradiated with laser light is imaged in the specimen 19, wherein the latter is illuminated with the intensity distribution of an Airy disk. In doing so, a point on the specimen 19 is aimed for and an image of this point is formed on the measurement diaphragm 16, wherein the position and size of this image can be evaluated by the detector 17. The measurement diaphragm 16 can only pass light from an adjusted focal plane.

In this case, also, the specimen 19 is located between two objectives in a manner analogous to the first embodiment example (according to Fig. 1); one of these objectives forms the microscope objective 20 and another objective 21 is part of a reflecting device 22. A mirror 23 is arranged inside the reflecting device 22 following objective 21 and can be constructed as a phase-conjugating or adaptive mirror. With a mirror of this kind (as was already shown with reference to the field-transmitting system), the laser light transmitted from the specimen 19 is reflected back into itself exactly with respect to direction and phase front.

For the special case in which the mirror 23 is constructed as an adaptive mirror and is outfitted with actuating elements for deformation of its mirror surface, a control circuit 24 can be provided, as is indicated in Fig. 2, which is connected with the detector 17 on the input side and with the actuating elements of the adaptive mirror 23 on the output side.

For example, when the control circuit 24 is programmed in such a way that it sends actuating signals to the adaptive mirror 23 depending on the radiation intensity received by the detector 17, it is achieved in an advantageous manner that by appropriate actuation of the actuating elements the curvature of the mirror surface is automatically adjusted such that the detector 17 can receive a fluorescent radiation of maximum intensity proceeding from the specimen 19.

As in the first embodiment example according to Fig. 1, the objectives 20 and 21 located opposite one another symmetrically with respect to the specimen 19 should also be identically constructed with respect to their optical parameters and the specimen 19 should be prepared between two optically identical, high-grade cover glasses.

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and is accordingly detected by the microscope objective 3 as well as by objective 3. After traversing the objective 3, the fluorescent light is parallel and impinges on the mirror 5 by which it is reflected back precisely in the focus of the microscope objective 2 and is collected by the microscope objective 2; after passing through the dichroic beam splitter 8, the blocking filter 10 and the eyepiece 11, it is now available for observation (or other evaluation).

Insofar as a laser is provided as illumination source and the observation of the specimen 1 is carried out in coherent light, a phase-conjugating mirror can advantageously be provided as mirror 5, the use of which ensures that the light impinging on the mirror surface is reflected back into itself in a highly accurate manner as intended.

The microscope can accordingly be operated with excitation by transmitted light as well as reflected light. The excitation filter 7 ensures that only the excitation beam reaches the microscope beam path 9 from the illumination source 6. On the other hand, the blocking filter 10 passes only the fluorescent light which is emitted by the specimen and which ~~is to be~~ evaluated.

The dichroic beam splitter 8 reflects the short-wave excitation light coming from the illumination source 6 and passes the longer-wave fluorescent light proceeding from the specimen 1. The excitation light is accordingly directed onto the specimen 1, while the fluorescent radiation collected by the microscope objective 2 and objective 3 passes through the beam splitter 8 and the blocking filter 10 to the eyepiece 11 and into the eye of the observer.

As is indicated in Fig. 1, a partially-transmitting mirror 12 can be provided in the microscope beam path 9 between the microscope objective 2 and the beam splitter 8. When this mirror 12 is constructed in such a way that it transmits the illumination wavelength but reflects the fluorescence wavelength back onto the specimen again, the microscope objective 2 and the objective 3 form the optical resonator, mentioned above, by which very small phase interferences can be detected.

It is further shown in Fig. 1 that the reflecting device 4 can be exchanged with a photomultiplier 13. This can be accomplished by means of a swiveling device so that the arrangement can be configured for photometric transmitted-light measurements without cumbersome conversion.